WHAT WE CLAIM IS:

1. A scanning optical microscope comprising:

a light source;

a wavefront converting element for applying a desired wavefront conversion to illuminating light emitted from said light source;

an objective for collecting wavefront-converted illuminating light emerging from said wavefront converting element onto a sample;

a detector for detecting signal light emitted from said sample; and

an actuator for scanning said objective along a direction perpendicular to an optical axis.

2. A scanning optical microscope according to claim 1, wherein when said actuator scans one section of the sample perpendicular to the optical axis with said objective, said wavefront converting element applies a constant wavefront conversion to said illuminating light.

3. A scanning optical microscope according to claim 1 or 2, wherein when an amount of movement of said objective along a direction perpendicular to the optical axis is denoted by ΔX, the following condition (1) is satisfied:

$$\Delta X \leqq 0.66 f_{OB} \cdot \lambda / (\Delta Z \cdot NA^4) \quad \cdots (1)$$

where:

f_{OB}: a focal length of the objective;

ΔZ: an amount of focal point movement caused by the wavefront converting element;

λ : a wavelength of the illuminating light;

NA: a numerical aperture of the objective.

4. A scanning optical microscope comprising:

a light source;

an optical element having a positive power for converting illuminating light emitted from said light source into a convergent beam;

a reflecting mirror with an aperture;

a reflection type wavefront converting element for applying a desired wavefront conversion to said illuminating light;

an objective for collecting said wavefront-converted illuminating light onto a sample; and

a detector for detecting signal light emitted from said sample.

5. A scanning optical microscope according to claim 4, wherein an optical system including said reflecting mirror with an aperture satisfies the following condition (2):

$$r_{Hmin}/r_{Minc} \leqq 0.5 \quad \cdots(2)$$

where:

r_{Hmin}: a minimum value of a length from an optical axis to a reflecting mirror edge;

r_{Minc}: a radius of wavefront-converted illuminating light incident on the reflecting mirror with an aperture.

6. A scanning optical microscope comprising:

a light source;

an optical element having a positive power for converting illuminating light emitted from said light source into a convergent beam;

a reflecting mirror placed at a position where said convergent beam is collected;

a reflection type wavefront converting element for applying a desired wavefront conversion to said illuminating light;

an objective for collecting said wavefront-converted illuminating light onto a sample; and

a detector for detecting signal light emitted from said sample.

7. A scanning optical microscope according to claim 6, wherein an optical system including said reflecting mirror satisfies the following condition (3):

$$r_{Mmin}/r_{Ainc} \leqq 0.5 \quad \cdots(3)$$

where:

r_{Mmin}: a minimum value of a length from an optical axis to a reflecting mirror edge;

r_{Ainc}: a radius of wavefront-converted illuminating light at a position of the reflecting mirror.

8. A scanning optical microscope comprising:

a light source;

a reflection type wavefront converting element for applying a desired wavefront conversion to illuminating light emitted from said light source; and

an objective for collecting wavefront-converted illuminating light onto a sample;

wherein said light source also serves as a detector for detecting signal light emitted from said sample.

9. A scanning optical microscope comprising:

a light source;

a reflection type wavefront converting element for applying a desired wavefront conversion to illuminating light emitted from said light source;

an objective for collecting wavefront-converted illuminating light emerging from said wavefront converting element onto a sample; and

a detector for detecting signal light emitted from said sample;

wherein said reflection type wavefront converting element is placed in an optical path so as to satisfy the following condition (4):

$$\theta_{PR} \leqq 50 \cdot NA^{-1} \sqrt{(\lambda \cdot \Delta Z^{-1})} \quad \cdots (4)$$

where:

θ_{PR}: an angle (°) of incidence of a principal ray on said wavefront converting element;

ΔZ: an amount of focal point movement;

λ : a wavelength of said illuminating light;

NA: a numerical aperture of said objective.

10. A scanning optical microscope comprising:

a light source;

a reflection type wavefront converting element for applying a wavefront conversion to illuminating light emitted from said light source;

an objective for collecting wavefront-converted

illuminating light emerging from said wavefront converting element onto a sample; and

a detector for detecting signal light emitted from said sample;

wherein a reflecting surface of said reflection type wavefront converting element is controllable into an aspherical toric surface configuration.